AMENDMENTS TO THE CLAIMS

The listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims

1. (Currently Amended) A method ~~Method~~ for decoding a convolutionally coded input data signal y comprising:

- multiplying the input data signal with a scaling factor L_c;

- demultiplexing the multiplied input data signal $L_c y$ into three signals which are related to systematic bits and parity bits, a demultiplexed input data signal $L_c S$ being associated with the systematic bits;

- turbo decoding the demultiplexed input data signal $L_c S$ in order to obtain turbor decoded output data Λ,

characterized in that, the scaling factor L_c; is updated for a next iteration in dependence on a combination of a posteriori likelihood data based on turbo decoded output data Λ and a priori likelihood data based on the demultiplexed signal $L_c S$. using an estimate of the mean value of the signal amplitude $\hat{c}$ and an estimate of the noise variation $\hat{\sigma}^2_{n'}$

in which the estimate of the mean value of the signal amplitude is equal to

$$\hat{c} = \frac{1}{N}\sum_{i=0}^{N-1} \operatorname{sgn}(\Lambda_i) \cdot L_c \cdot s_i$$

where N is the number of bits in a coding block of the input data signal s_i is the i^{th} systematic bit $\hat{c}$ is the estimation of the mean value of the amplitude of the scaled systematic bits $L_c \cdot s_i$ and Λ is the log-likelihood ratio resulting from the most recent turbo decoder iteration,

and in which the noise variance estimation $\hat{\sigma}^2_{n'}$ equals

$$\hat{\sigma}^2_{n'} = \frac{1}{N-1}\sum_{i=0}^{N-1} (s'_i - 1)^2 \cdot P_i(1) + (s'_i + 1)^2 \cdot P_i(0) - K;$$

the probability of the i^{th} bit being zero is estimated like $\Pr\{x_i = 0\} = P_i(0) = \frac{1}{1+e^{-\Lambda_i}}$

and the probability of that bit being one like $\Pr\{x_i = 1\} = P_i(1) = \frac{1}{1+e^{\Lambda_i}} = 1 - P_i(0)$:

the normalized systematic bits s_i' are calculated as $s_i' = \frac{L_c \cdot s_i}{\hat{c}}$:

and where K is a bias correction computed as $K = \frac{1}{N}\sum_{i=0}^{N-1} 2 \cdot (P_i(0) - P_i(1)) \cdot s_i' - 2$.

2. (Cancelled)

3. (Currently Amended) The method ~~Method~~ according to claim 1, in which the scaling factor is updated according to $\hat{L}_c = \frac{2}{\hat{c} \cdot \hat{\sigma}_n^2} \cdot L_c$, in which $\hat{L}_c$ is the updated scaling factor.

4 -5. (Cancelled)

6. (Currently Amended) The method ~~Method~~ according to claim 1 ~~one of the proceeding claims~~, in which the scaling factor L_c is initialized either as a fixed value, as the result of an initial number of iterations using a known algorithm, as the result of filtering over subsequent iterations and coding blocks, or as the result of SNR/SIR estimation of the input data signal y.

7. (Currently Amended) The method ~~Method~~ according to claim 1 ~~one of the proceeding claims~~, further comprising

calculating the variation of the scaling factor in subsequent iterations and, when the variation after a predetermined number of iterations is above a predetermined threshold value, reverting to a different scaling factor calculation method and/or turbo decoding method.

8. (Currently Amended) A decoder ~~Decoder~~ device for decoding a convolutionally coded input data signal y comprising

- a multiplication element ~~(8)~~ for multiplying a received input data signal y with a scaling factor L_c,

- a demultiplexer ~~(6)~~ for demultiplexing the multiplied input data signal $L_c y$ into three signals which are related to systematic bits and parity bits, a demultiplexed input data signal $L_c S$ being associated with the systematic bits;

- a turbo decoder ~~(5)~~ for decoding the demultiplexed input data signal in order to obtain turbo decoded output data Λ,

~~characterized in that~~, the decoder device (10) further comprises an adaptive scaling element ~~(7)~~ which is arranged to update the scaling factor L_c for a next iteration based on a combination of a posteriori likelihood data based on turbo decoded output data Λ and a priori likelihood data based on the demultiplexed signal $L_c S$, using an estimate of the mean value of the signal amplitude $\hat{c}$ and an estimate of the noise variation $\hat{\sigma}_n^2$

in which the estimate of the mean value of the signal amplitude is equal to

$$\hat{c} = \frac{1}{N}\sum_{i=0}^{N-1}\mathrm{sgn}(\Lambda_i)\cdot L_c \cdot s_i$$

where N is the number of bits in a coding block of the input data signal, s_i is the i^{th} systematic bit, $\hat{c}$ is the estimation of the mean value of the amplitude of the scaled systematic bits $L_c \cdot s_i$ and Λ_i is the log-likelihood ratio resulting from the most recent turbo decoder iteration

and in which the noise variance estimation $\hat{\sigma}_n^2$ equals

$$\hat{\sigma}_n^2 = \frac{1}{N-1}\sum_{i=0}^{N-1}(s_i'-1)^2\cdot P_i(1)+(s_i'+1)^2\cdot P_i(0)-K;$$

the probability of the i^{th} bit being zero is estimated like $\Pr\{x_i = 0\} = P_i(0) = \frac{1}{1+e^{-\Lambda_i}}$

and the probability of that bit being one like $\Pr\{x_i = 1\} = P_i(1) = \frac{1}{1+e^{\Lambda_i}} = 1 - P_i(0)$;

the normalized systematic bits s'_i are calculated as $s'_i = \frac{L_c \cdot s_i}{\hat{c}}$;

and where K is a bias correction computed as $K = \frac{1}{N}\sum_{i=0}^{N-1} 2 \cdot (P_i(0) - P_i(1)) \cdot s' - 2$.

9. (Currently Amended) The decoder ~~Decoder~~ device according to claim 8 [[5]], in which the adaptive scaling element ~~(7)~~ is further arranged to update the scaling factor according to $\hat{L}_c = \frac{2}{\hat{c} \cdot \hat{\sigma}_n^2} \cdot L_c$ in which $\dot{L}_c$ is the updated scaling factor.

10. (Canceled)

11. (New) The decoder device according to claim 8, in which the decoder device is further arranged to initialize the scaling factor L_C either as a fixed value, as the result of an initial number of iterations using a known algorithm, as the result of filtering over subsequent iterations and coding blocks, or as the result of SNR/SIR estimation of the input data signal y.

12. (New) The decoder device according to claim 8, in which the decoder device is further arranged to calculate the variation of the scaling factor in subsequent iterations and, when the variation after a predetermined number of iterations is above a predetermined threshold value, reverting to a different scaling factor calculation method and/or turbo decoding method.